

REMARKS

Claims in the case are 14, 16-18 and 24-28, upon entry of this amendment. Claim 14 has been amended, Claims 26-28 have been added, and Claim 15 has been cancelled without prejudice herein. Claim 23 was cancelled without prejudice in an amendment dated 16 May 2005. Claims 19 and 20 were cancelled without prejudice in an amendment dated 10 January 2005. Claims 1-13, 21 and 22 were cancelled without prejudice in previous amendments.

Claim 14 has been amended herein to limit the sintering aid (a) to Al_2O_3 and Y_2O_3 . Basis for this amendment to (a) of Claim 14 is found in Claim 15, and at page 3, lines 5-7 of the specification. Item (iii) of Claim 14 has been amended herein to replace "2" with --0.5--, basis for which is found in Examples 1b, 1c, 2b and 2c of Table 1 on page 9 of the specification. Claim 14 has also been amended herein to include a further wherein clause as to mass loss of the silicon nitride material upon immersion in HCl, basis for which is found in Examples 1b, 1c, 2b and 2c of Table 1 on page 9 of the specification.

Basis for added Claims 26 and 27 is found in Examples 2b and 2c in Table 1 on page 9 of the specification. Basis for added Claim 28 is found in Examples 2b and 2c in Table 1 on page 9 of the specification, and is derived from the recited molar amounts of Y_2O_3 and Al_2O_3 , which is 5 moles and 3 moles, respectively.

Claim 25 stands rejected under 35 U.S.C. § 112, first paragraph. This rejection is respectfully traversed in light of the following remarks.

Basis for Claim 25 is found at page 3, lines 14-20 of the specification. The silicon nitride materials of Applicants' present invention may contain additives that react with Si_3N_4 to form silicides. In particular, WO_3 and MoO_3 each react with Si_3N_4 to form tungsten silicide and molybdenum silicide respectively. See page 3, lines 14-20 of the specification. Basis for the ratio of "up to 10 mole percent" as recited in Claim 25 is found at page 3, lines 26-27 of the specification.

In light of the preceding remarks, Applicants' specification and claims are deemed to fully comply with the written description requirements of 35 U.S.C. § 112, first paragraph. Reconsideration and withdrawal of the present rejection is respectfully requested.

Claims 14-18, 24 and 25 stand rejected under 35 U.S.C. §§ 102(a or e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over United States Patent No. 5,804,523 (**Oda et al**), United States Patent No. 5,885,916 (**Tajima et al**) or United States Patent No. 5,998,319 (**Hintermayer**), each taken alone. This rejection is respectfully traversed with regard to the amendments herein and the following remarks.

Oda et al disclose a sintered product of silicon nitride that includes: at least 70 mole percent of beta-silicon nitride; a Group 3a element that at least includes Lu; and impurity oxygen in the form of SiO₂. See the abstract, and column 2, lines 44-60 of Oda et al. In addition, Oda et al teaches that the oxynitride content of the silicon nitride material is not critical. See column 4, lines 1-20 of Oda et al.

Tajima et al disclose a dielectric material having a low dielectric loss factor for high frequency use, that includes a sintered product of silicon nitride containing: oxygen as an impurity in the form of SiO₂; a Group 3a element; and less than or equal to 2 percent by weight of aluminum in the form of aluminum oxide. See column 3, lines 18-28 of Tajima et al.

Hintermayer discloses a sintered silicon nitride that includes: silicon nitride; and 5 to 20 percent by weight of a glass component (e.g., SiO₂ or Al₂O₃), which originally had a particle size of less than 2 micrometers. See the abstract, and column 1, lines 62-67 of Hintermayer.

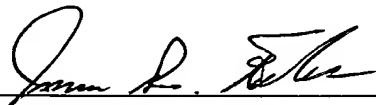
Oda et al, Tajima et al and Hintermayer, either alone or in combination do not disclose, teach or suggest a silicon nitride material according to Applicants' present claims: (i) that includes a sintering aid consisting of only Al₂O₃ and Y₂O₃; (ii) in which SiO₂, Al₂O₃ and Y₂O₃ are present in the boundary phase; (iii) in which the ratio of (SiO₂) to (SiO₂ + Al₂O₃ + Y₂O₃) is from greater than 65 percent to 75 percent (e.g., 72 percent or 74 percent); (iv) that has a silicon oxide nitride content of less than 1 percent by weight; and (v) that has a porosity of less than 0.5 percent by volume. In addition, Oda et al, Tajima et al and Hintermayer, either alone or in combination, do not disclose, teach or suggest a silicon nitride material according to Applicants' present claims that has a mass loss of less than or equal to 0.3 mg/cm² when immersed in HCl at a temperature of 60°C for 500 hours.

The unique and unexpected properties of the silicon nitride material of Applicants' present claims is demonstrated with reference to Examples 1a through 1d, and 2a through 2c, as summarized in Table 1 on page 9 of the specification. Those silicon nitride materials according to the present invention (i.e., as represented by Examples 1b, 1c, 2b and 2c) provide a mass loss of less than or equal to 0.3 mg/cm^2 when immersed in HCl at a temperature of 60°C for 500 hours. For purposes of illustration, Comparative Example 2a has an (SiO_2) to $(\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Y}_2\text{O}_3)$ ratio of less than 65% (i.e., of 30%), and a 60°C HCl immersion weight loss of 10 mg/cm^2 at 100 hours, and 16 mg/cm^2 at 500 hours. Examples 1b, 1c, 2b and 2c, which are representative of Applicants' presently claimed silicon nitride material have 60°C HCl immersion weight loss values of less than or equal to 0.3 mg/cm^2 at 100 hours and 500 hours. For purposes of quantitative comparison (with regard to the 60°C HCl immersion for 500 hours), the mass loss of the silicon nitride material of Comparative Example 2a (10 mg/cm^2) is 69.6 time greater than that of Example 2b (0.23 mg/cm^2), which is according to the present invention.

In light of the amendments herein and the preceding remarks, Applicants' claims are deemed to be unanticipated by, and unobvious and patentable over Oda et al, Tajima et al and Hintermayer. Reconsideration and withdrawal of the present rejection is respectfully requested.

In light of the amendments herein and the preceding remarks, Applicants' presently pending claims are deemed to meet all the requirements of 35 U.S.C. §112, and to define an invention that is unanticipated, unobvious and hence, patentable. Reconsideration of the rejections and allowance of all of the presently pending claims is respectfully requested.

Respectfully submitted,

By 

James R. Franks
Agent for Applicants
Reg. No. 42,552

Bayer MaterialScience LLC
100 Bayer Road
Pittsburgh, Pennsylvania 15205-9741
(412) 777-3808
FACSIMILE PHONE NUMBER:
(412) 777-3902
s:\shared\kgb\jrf437amf